2002 REPORT TO CONGRESS

Over 200 school children planted trees and shrubs at the second annual Paradise Creek Watershed Festival. The October 2002 festival was part of the local match for a Clean Water Act section 319 project designed to construct a functional floodplain, recreate meanders, stabilize stream banks, and plant a native riparian vegetation buffer along Paradise Creek in northern Idaho.

Taking Plans to Action

STATE OF IDAHO NONPOINT SOURCE MANAGEMENT PROGRAM

Department of
Environmental Quality
1410 North Hilton
Boise, ID 83706

2002 REPORT TO CONGRESS

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IDAHO NONPOINT SOURCE MANAGEMENT PROGRAM

OVERVIEW

This *2002 Report to Congress* is divided into three main sections: 1) the summary results of the 2002 project field evaluation season, 2) a summary of four ongoing project "placed-based" focus areas, and 3) a summary of three projects completed during 2002.

During summer and fall 2002 the State of Idaho, Department of Environmental Quality (DEQ) evaluated 27 of 50 ongoing nonpoint source (NPS) contracted projects. Field evaluators recorded a variety of best management practices related to the seven recognized NPS sectors of logging, agriculture, mining, hydrologic-habitat modification, ground water, transportation, and urban stormwater runoff. The entire report containing all 27 evaluations, including full sets of photographs, is available for review on DEQ's Web site at: **http://www.deq.state.id.us/water/water1.htm**. Scroll down to "Nonpoint Source Management Program" and click on *"2002 Field Evaluation Progress Report for Idaho's NPS Program."*

Four ongoing project "placed-based" focus areas—Cascade Reservoir, Succor Creek of the Snake River, Jim Ford Creek of the Clearwater River, and Paradise Creek of the Columbia River—are highlighted in the 2002 report because they exemplify outstanding coordination, design, and implementation in four different geographic locations throughout the state of Idaho. Multiple individual 319 projects have been completed in each of these areas.

Completion reports were submitted for three projects during FY 2002. Contained in this annual Report to Congress are brief summaries for the Lower Boise River Coliform Bacteria DNA Testing Project, the OX Ranch Agriculture Best Management Practices Implementation Project, and the Ground and Surface Water Interaction Related to Nutrients Within Mason Creek Agricultural Drain Project.

SECTION 1

Results of the 2002 Project Field Evaluation Season

The State of Idaho, Department of Environmental Quality (DEQ) currently oversees approximately 50 active nonpoint source (NPS) regional projects in Idaho. To assure that the projects are completed in a timely manner and achieve their overarching goal of cleaning up and preventing NPS water pollution, all projects are subject to field evaluation by DEQ staff. DEQ staff set a goal to field evaluate the progress of half of the projects annually. Therefore, over a two-year cycle generally all of the ongoing projects will receive field evaluation. During the summer and fall of 2002, staff from the DEQ State Office exceeded its goal by evaluating 27 of 50 ongoing NPS contracted projects (Figure 1 and Table 1).

DEQ evaluators traveled to 21 geographical areas of Idaho and evaluated 27 contracted projects during the summer and fall of 2002. With the exception of two contracted projects on Coeur d'Alene tribal lands and three contracted projects covering the historic Rex Mill site near Coeur d'Alene, all of the contracted projects demonstrated substantial progress toward completing their designated tasks to reduce, eliminate, or prevent NPS water pollution.

Although some of the work on the two Coeur d'Alene tribal lands projects has been completed, most of the work has been repeatedly delayed due to two tribal management changes, proposed project adjustments, and bad weather. The U. S. Bureau of Land Management repeatedly delayed three mining related projects scheduled at Rex Mill, resulting in the withdrawal of NPS funding by DEQ. However, important reclamation work at this historic gold and silver mill will be achieved through other private and state funding sources.

Field work evaluated by DEQ staff on NPS projects included a variety of common best management practices (BMPs) related to the seven recognized NPS sectors of the 1999 *Idaho Nonpoint Source Management Plan*: logging, agriculture, mining, hydrologic-habitat modification, ground water, transportation, and urban storm water runoff. Evaluators examined work on road-related BMPs that overlap into all seven sectors. These BMPs included eradicating unneeded roadways, applying gravel to roadbeds, creating logging truck friendly rolling water bars, and installing fish friendly culverts. Other overlapping road-related BMPs observed included installing properly sloped roadbeds, planting drought resistant vegetation along road cuts and fills, and installing check dams along borrow ditches.

Many of the evaluated agriculture-related BMPs required education and close cooperation among farmers, ranchers, and numerous federal, state, and nonprofit organizations for implementation. These BMPs included installing vegetative buffer strips between crops and waterways, implementing no-till farming techniques, installing an array of agricultural runoff detention facilities, and planting suitable native vegetation in intermittent waterways that were formerly cultivated for crops. Evaluators also observed strategic placement of fencing to keep livestock out of streambeds, stream bank restoration, and the relocation of animal feeding operations (AFOs) away from waterways.

In the historic mining sector, evaluators observed BMPs designed to reduce or eliminate acid rock drainage. In order for acid rock drainage (caused by sulfuric acid) to form, three components (air, water, and sulfitic mine waste rock) must all be combined. Several BMPs observed in the field were designed to separate storm water and surface water from waste rock. The most common method to achieve separation involved capping and sloping mine waste rock to eliminate infiltration of surface water.

In the urban storm water runoff sector, evaluators toured stream channel restoration projects along Paradise Creek within the City of Moscow. Where the stream channel had been straightened, deepened, and lined with riprap in the mid-1900s to allow for development, a large and diverse group of stakeholders led by the Palouse-Clearwater Environmental Institute conducted a superb effort to recreate a meandering channel and floodplain. Other urban-related BMPs observed in Moscow and in Pocatello included the creation of wetlands and an innovative use of paleo-oxbow geomorphology to allow infiltration and clean storm water prior to discharge to streams.

To assist in tracking, each project is assigned a state contract number. If projects extend to several years and additional tasks and funding are granted, more than one state contract number may be assigned to a project area. Table 1 lists details of all 27 NPS contracted projects that were field evaluated during the summer and fall of 2002. These 27 different projects occurred at 21 sites around Idaho.

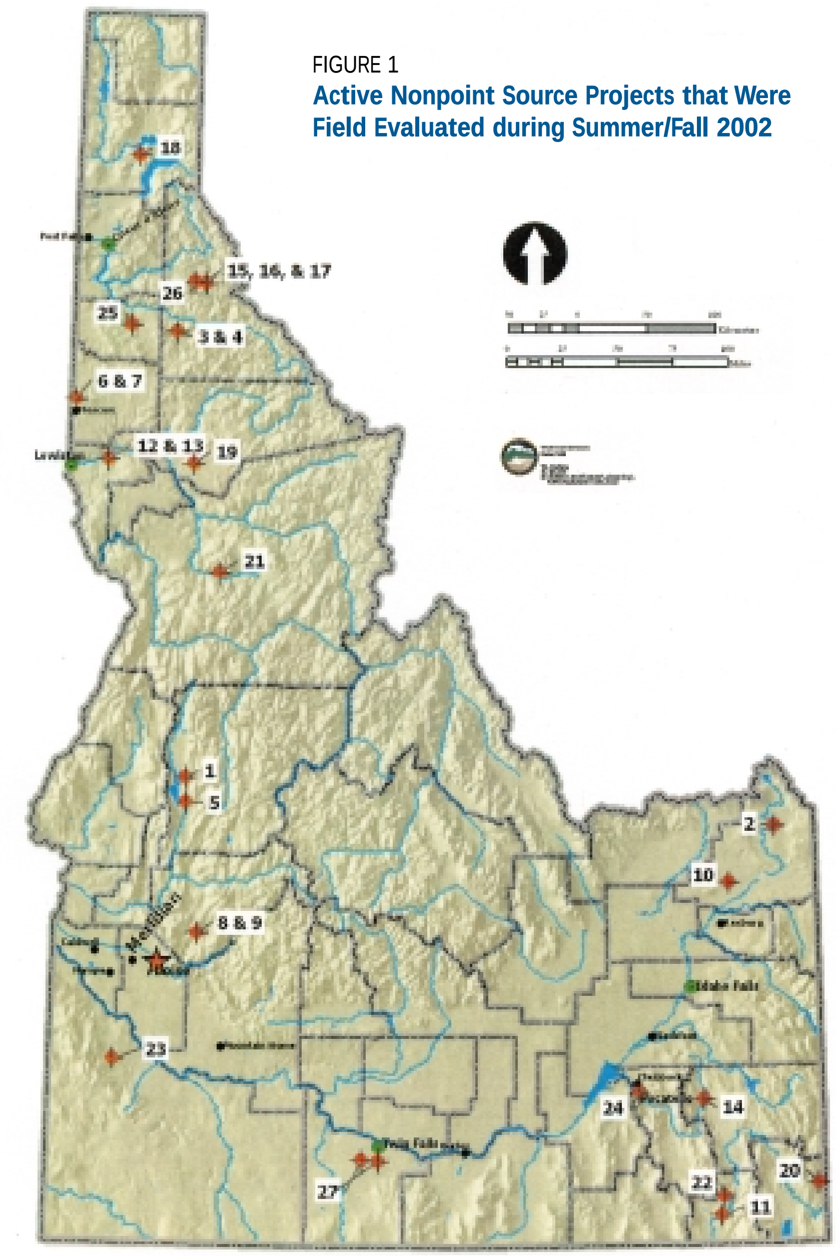


FIGURE 1
Active Nonpoint Source Projects that Were Field Evaluated during Summer/Fall 2002

TABLE 1

Active Nonpoint Source Projects That Were Field Evaluated during Summer/Fall 2002

Map Ref.[a]	Grant Year	Contract Number[b]	Project Name	Hydrologic Unit No.	Tasks or BMPs[b] Evaluated	Evaluator	DEQ Region
1	1999	Q525	Cascade Reservoir, Watershed and Roads	17050123	Sediment control BMPs for dirt roads	J. West	Boise
2	1998	Q444	Sheridan Creek Restoration	17040202	Stream bank stabilization, fencing, grazing plans, weed control	D. Reaney	Idaho Falls
3,4	1998, 1999	Q529 and Q366	Coeur d'Alene Tribe Wetland Creation and Restoration, Lake Creek – Plummer	1701030423	Sediment control BMPs for dirt roads	J. West	Coeur d'Alene
5	1999	Q558	Cascade Reservoir Watershed Roads and Forested Lands	17050123	Sediment control BMPs for dirt roads	J. West	Boise
6,7	1999, 2000	Q605 and Q562	Paradise Creek TMDL[d] Implementation #1 and #2	17060108	Sediment control BMPs for dirt roads, grazing plans, relocation of AFOs[e], fencing, crop management, stream channel rehabilitation, wetlands	J. West	Lewiston
8,9	1999, 2000	Q564 and S009	Scriver Creek Watershed Roads and Forested Lands	17050112	Sediment control BMPs for dirt roads	J. West	Boise
10	2000	Q608	Ashton Ground Water Protection	17040203	Nutrient management of crops	D. Reaney	Idaho Falls
11	2000	Q609	Bear River Fencing and Riparian Enhancement	16010202	Stream bank stabilization, fencing, grazing plans, weed control	D. Reaney	Pocatello
12, 13	2000, 2001	S011 and Q610	Winchester Lake Watershed NPSF Implementation and Upper Lapwai Creek Watershed	17060306	Sediment control BMPs for dirt roads	J. West	Lewiston
14	2000	S008	Twenty-Four Mile Creek TMDL Implementation	17040208	Stream bank stabilization, fencing, grazing plans, weed control	D. Reaney	Pocatello
15, 16, 17	1998, 1999, 2000	Q557,Q336, and S012	Completion of Designed Water Management at Rex Mill Site, E. Fork Ninemile Creek	17010302	ARD[g] control. Project terminated by 319 and refunded through other sources	J. West	Coeur d'Alene
18	2001	S014	Trestle Creek Watershed Conservation	17010214	Sediment control BMPs for dirt roads, conservation easements	J. West	Coeur d'Alene
19	2001	S015	Jim Ford Creek Watershed Enhancement	17060306	Sediment control BMPs for dirt roads, grazing plans, relocation of AFOs, fencing, crop management	J. West	Lewiston
20	2001	S016	Thomas Fork Stream Bank Protection	16010102	Sediment control BMPs for dirt roads	J. West	Pocatello
21	2001	S017	Phase 1 South Fork of Cottonwood Creek TMDL Implementation	17060305	Sediment control BMPs for dirt roads, grazing plans, relocation of AFOs, fencing, crop management	J. West	Lewiston
22	2001	S018	Porter Riparian Restoration Cub River	16010202	Stream bank stabilization, fencing, grazing plans	M. Shumar	Pocatello
23	2001	S019	Succor Creek/Homedale School District – Water Quality	17050103	Stream bank stabilization, agricultural irrigation water cleanup, fencing	D. Abderhalden	Boise

Map Ref.[a]	Grant Year	Contract Number[b]	Project Name	Hydrologic Unit No.	Tasks or BMPs[b] Evaluated	Evaluator	DEQ Region
24	2001	S022	North City Park Wetland	17040208	Storm water infiltration BMPs	J. West	Pocatello
25	2001	S024	Santa Creek Streambank Protection and Stability	17010304	Stream bank stabilization BMPs	J. West	Coeur d'Alene
26	2001	S025	Success Mill Site	17010302	ARD control, metal ion extraction from ground water	J. West	Coeur d'Alene
27	2001	S026	Rock Creek Rehabilitation	17040212	Variety of storm water infiltration BMPs	B. Clark	Twin Falls

[b] More than one contract number for a project indicates that additional funding was later granted for additional tasks.
[c] Best management practices
[d] Total maximum daily load
[e] Animal feeding operations
[f] Nonpoint source
[g] Acid rock drainage

SECTION 2

Summary of Four Ongoing Project "Placed-Based" Focus Areas

Four project areas—Cascade Reservoir, Succor Creek, Jim Ford Creek, and Paradise Creek—are highlighted because they exemplify outstanding coordination, design, and implementation.

Implementation Plan for the Cascade Reservoir Phase II Watershed Management Plan

Implementation actions specific to the Cascade Reservoir Watershed Phase II Total Maximum Daily Load (TMDL) for 2002 build on implementation actions conducted during the Phase I TMDL from 1996 to 2001.

Cascade Reservoir has been identified as water quality limited under section 303(d) of the Clean Water Act. Water quality studies have shown that phosphorus is the pollutant of concern within the watershed. Nuisance algae growth resulting from nutrient loading has impaired the designated beneficial uses of the reservoir; specifically, fishing, swimming, boating and agricultural water supply.

In accordance with section 303(d) requirements, a TMDL was established for Cascade Reservoir (Phase I in 1996, Phase II in 1998). The Phase II TMDL stated that a sustained 37 percent overall load reduction in total phosphorus would bring the reservoir into compliance with water quality standards as outlined below (1998).

At the start of implementation, total phosphorus loading from point sources averaged approximately 10 percent and estimated nonpoint source loading accounted for approximately 84 percent of the total loading to Cascade Reservoir. Effluent from poorly functioning or failing septic tanks in the watershed accounted for the remaining 6 percent of the total phosphorus load.

Initial monitoring indicates that the 37 percent reduction goal has been met. Total phosphorus load reductions identified by the TMDL included 100 percent removal of municipal wastewater treatment plant effluent, a reduced fish hatchery discharge, and 30 percent reduction in the nonpoint source total phosphorus load from forestry, agriculture, and urban/suburban land uses. To date, progress toward these goals has continued at a steady rate with watershed-wide participation.

CASCADE RESERVOIR WATER QUALITY CONCERNS

Segment Identifier:	Public Notification Requirements #884, Hydrologic Unit Code 17050123
Pollutants of Concern:	Nutrients (Phosphorus), Dissolved Oxygen, pH
Uses Affected:	Fishing, Swimming, Boating, Agricultural Water Supply
Known Sources:	Point Sources – McCall Municipal Wastewater Treatment Plant and Idaho Fish and Game Fish Hatchery
	Nonpoint Sources – Forestry, Agriculture, Urban/Suburban, Septic Systems, Internal Reservoir Recycling

SUMMARY OF CASCADE RESERVOIR PHASE II TMDL WATER QUALITY OBJECTIVES

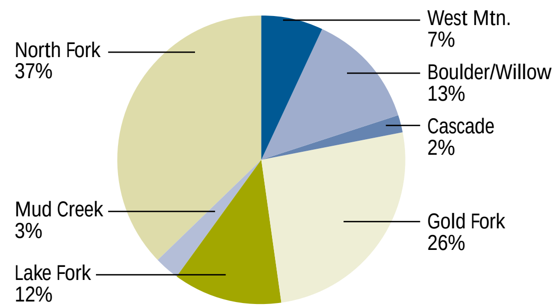
Water Quality Objectives:

- In-reservoir total phosphorus concentration of < 0.025 milligrams per liter (mg/L)
- In-reservoir chlorophyll a concentration of < 10 micrograms per liter (µg/L)
- In-reservoir dissolved oxygen concentration exceeding 6 mg/L at all times (except for the bottom 20 percent of water depth where depths are 35 meters or less and hypolimnion waters in stratified lakes and reservoirs)
- In-reservoir pH between 6.5 and 9.5 standard units

Loading for the Phase II TMDL and implementation plan was based on measured total phosphorus loads for water years 1993 to 1996. Figures 2 and 3 illustrate the relative contribution of each identified source to the total phosphorus load entering Cascade Reservoir at the time the TMDL was completed. Table 2 provides a breakdown of the reduction goals within the watershed, first established in the 1998 *Cascade Reservoir Watershed Management Plan.*

FIGURE 2
Total phosphorus loading identified by subwatershed in the *Cascade Reservoir Phase II Watershed Management Plan*

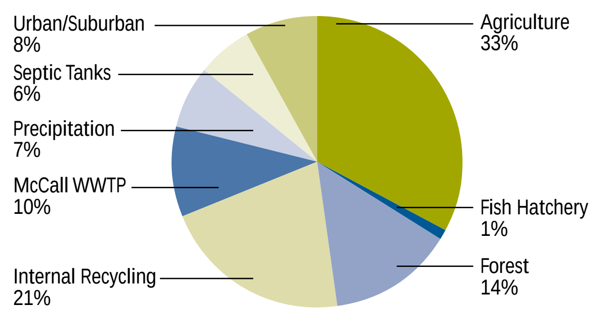
PERCENT LOADING BY SUBWATERSHED



The implementation plan established a yearly reporting scenario where the efforts and accomplishments of each source within the watershed would be highlighted. Information reported will also be used to measure progress on a source-specific basis and cost efficiency of implementation measures. Progress and accomplishments made toward the nonpoint source loading allocation during 2002 are outlined in the following section.

FIGURE 3
Total phosphorus loading identified by source in the *Cascade Reservoir Phase II Watershed Management Plan*

PERCENT LOADING BY SOURCE



NONPOINT SOURCE IMPLEMENTATION PROJECTS

Water quality improvement projects within the watershed have been divided by subwatersheds. These subwatersheds were given a priority ranking based on how much phosphorus was being delivered to the reservoir, proximity to the reservoir, cost-efficiency and cost-benefit analyses, and other factors. The subwatersheds were ranked in order of priority (highest to lowest) as follows: Boulder/Willow, West Mountain, Lake Fork, Gold Fork, Mud Creek, Cascade, and North Fork Payette River (not currently ranked). Within each subwatershed, projects are divided into three primary categories based on land use: forestry, agriculture, and urban/suburban. Some nonpoint source implementation projects currently underway are discussed in the source-specific sections that follow.

TABLE 2

Annual Total Phosphorus Load (kilograms per year) to Cascade Reservoir Averaged from 1993 through 1996 Instream Monitoring Data

Nonpoint Sources		**Annual Phosphorus Load Allocated from Measured Load, kg/yr**					**Reduction Goal, kg/yr**
		Natural Load & Background	**Forestry**	**Agriculture**	**Urban**	**Total**	
Subwatershed	Cascade[a]	209	2	222	229	662	199
	Gold Fork	4,704	3,164	742	63	8,673	2,602
	Lake Fork	600	126	2,401	792	3,919	1,176
	Mud Creek	167	8	612	245	1,032	310
	North Fork[a]	3,445	739	6,994	1,342	12,520	3,756
	West Mountain	984	924	391	83	2,382	715
	Boulder/Willow	922	866	2,232	303	4,323	1,297
Septic[b]						2,205	840
Nonpoint Source Totals		11,031	5,829	13,594	3,057	35,716	10,895
Point Sources		**Annual Phosphorus Load Allocated from Measured Load, kg/yr**					**Reduction Goal, kg/yr**
						Total	
McCall Wastewater Treatment Plant						3,947	3,947
McCall Idaho Fish and Game Fish Hatchery					218	0	
Point Source Totals						4,165	3,947
Grand Totals		**11,031**	**5,829**	**13,594**	**3,057**	**39,881**	**14,842**

[a] See *Identified Data Gaps* discussion in Section 2.3.3 of the Phase II TMDL, the discussion under the Implementation Priorities for Nonpoint Source Loads on page 12, and the discussion under the heading Agricultural Source Implementation Plan on page 26 of this document for more information.

[b] Septic system loads and load reductions were calculated separately from the 30 percent nonpoint source load reductions and are not allocated specifically to any subwatershed.

FORESTRY IMPLEMENTATION

The major source of anthropogenic total phosphorus loading from forested lands in the watershed has been identified to be from road-related sediment runoff and transport. In 2002, 100 percent of the forestry nonpoint source total phosphorus goal was achieved.

Forest Roads

- Over 109 miles of road have been treated to date, including 81 miles of road that were graveled, 3.5 miles that were closed, 0.1 miles that were paved, and 24.7 miles of road that received drainage upgrades. Estimated percent reductions in sediment and total phosphorus achieved are shown in Table 3.
- Additional road segments are currently scheduled for treatment.

TABLE 3

Estimated Percent Anthropogenic Sediment and Total Phosphorus Reductions from Implementation of Forest Best Management Practices (BMPs) from 1994 though 2002

Watershed	Sediment Reduction	Total Phosphorus Reduction
Boulder/Willow	84%	84%
Gold Fork	81%	81%
North Fork Payette	80%	80%
West Mountain	87%	86%
Watershed-Wide Average Reduction	**83%**	**83%**

Note: The other watersheds have a minor acreage of forested lands and therefore were much lower on the priority list. The 100+ percent reduction was achieved before they got that low on the priority list.

Grazing Management

- A joint effort between Idaho Department of Lands, US Forest Service, Boise Cascade Corporation, and other private landowners has been initiated to update and correlate grazing management plans.
- Nearly 100 percent of grazing allotments on public forested lands are now under grazing management plans (10-year cycle will include all in near future).
- Dramatic improvements in stream bank vegetation have been observed in areas where grazing management plans have been put in place or updated. This is especially evident in the Gold Fork (where an 80 percent reduction in total phosphorus has been observed) and West Mountain subwatersheds.

Table 4 contains a summary of forestry implementation projects completed in 2002 and the associated reductions and costs.

TABLE 4

Estimated Total Phosphorus Reductions Achieved and Associated Costs of Forestry Implementation Projects Completed in 2002

Project	Total Phosphorus Reduction	Sediment Reduction	Project Cost	Source of Funding
Hartzell Creek road improvements	48 kg/year	304 tons/year	$27,992	319 and private funds
Copeland Timber sale road and drainage improvements	4 kg/year	24 tons/year	$2,238	319 and private funds
Willow Creek road and drainage improvements	18 kg/year	117 tons/year	$10,800	319 and private funds
2002 Total	**70 kg/year**	**445 tons/year**	**$41,030**	**319 and private funds**

The total phosphorus reductions realized through implementation on forested lands are estimated from the efficiency of the BMPs in place. Monitoring will continue to review applied BMPs. Improvements to additional road segments will continue to be treated as part of timber harvest activities or will be done independently.

AGRICULTURAL IMPLEMENTATION

The 2002 Farm Bill funded Environmental Quality Incentives Programs (EQIPs), Wildlife Habitat Incentives Programs (WHIPs) and several other agricultural cost-share programs through 2007. The primary agricultural cost share program funded by the State of Idaho was not funded for new contracts beginning 2001. The State of Idaho Water Quality Program for Agriculture will likely not be funded for fiscal year 2004. The U. S. Department of Agricultural EQIP Lake Fork Priority Area was not funded in 2002. The Environmental Quality Incentives Program was the primary program funding agricultural BMPs.

Despite these difficulties, new BMPs were implemented on 129 acres of agricultural land over the 2002 season, and maintenance and qualitative monitoring of existing BMPs has continued.

Treatment Prioritization

- Tier 1 acres (150 feet on either side of the steam channel) have been identified as the first priority in treatment/implementation.
- Tier 2 acres (irrigated uplands) have been identified as the second priority in treatment/implementation.
- Treatment of agricultural lands includes both irrigation and grazing management.

Grazing and Irrigation Management

- Contracts were developed with the private landowners to provide cost share to implement the conservation plan and approved BMPs.
- During 2002, 29 Tier 1 acres were treated with treatment systems developed for specific landowners. The 29 acres will be excluded from livestock grazing during the 10-year life of the contract. The systems used on Tier 1 lands include fences, use exclusion and tree/shrub establishment.
- During 2002, 100 Tier 2 acres were treated. The 100 acres will be excluded from livestock grazing during the 10-year life of the contract. The systems used on Tier 2 lands include tree/shrub planting, wetland wildlife habitat management, upland wildlife habitat management and pest management.

Table 5A contains a summary of agricultural implementation projects completed in 2002 and their associated reductions and costs. Table 5B contains a summary of agricultural BMP implementation progress to date.

The total phosphorus reductions realized through implementation on agricultural lands are estimated from the efficiency of BMPs in place. Monitoring will continue to validate estimated reductions in total phosphorus loading.

TABLE 5A

Estimated Total Phosphorus Reductions Achieved and Associated Costs of Agricultural Implementation Projects Completed in 2002

Conservation Planning[a]	Tier	Acres	Project Cost	Source of Funding[b]
Boulder/Willow subwatershed implementation	1 2 3	312 16 64	$4,502 $7,123	319 Grant EQIP
Gold Fork subwatershed	2	73		
Cascade subwatershed	2	50		
Project	**Total Phosphorus Reduction**	**Sediment Reduction**	**Project Cost**	**Source of Funding**
North Fork Payette subwatershed grazing management system on 29 Tier 1 acres	4.3 kg/year	27 tons/year	$13,333	WHIP and private funds
Boulder/Willow subwatershed grazing management system on 46 Tier 1 acres and 100 Tier 2 acres	16 kg/year (tier 1) 17 kg/year (tier 2)	102 tons/year 110 tons/year	$1,178 $3,084	319 Grant WHIP and private funds
2002 Total	**37 kg/year**	**239 tons/year**	**$29,220**	**319 Grant, WHIP and private funds**

[a]This report does not incorporate acres in the planning process or conservation plans developed, but not signed.

[b] EQIP = Environmental Quality Incentives Program, WHIP = Wildlife Habitat Incentives Program

TABLE 5B

Agricultural Acres Treated and/or Cost Shared by Subwatershed Through December 2002

Subwatershed	Tier 1 Acres Treated	% Tier 1 Acres Treated	Tier 2 Acres Treated	% Tier 2 Acres Treated	Tier 3 Acres Treated	% Tier 3 Acres` Treated	Total Acres Treated	Total Dollars Spent
Boulder/Willow	183	29%	2,288	43%	0	0%	2,371	$ 798,141
Cascade	0	0%	180	5%	0	0%	180	$ 72,389
Gold Fork	213	24%	371	12%	0	0%	584	$ 196,710
Lake Fork	0	0%	386	9%	0	0%	386	$ 192,469
Mud Creek	131	24%	6,253	105%	0	0%	6,384	$1,332,269
North Fork Payette	34	3%	0	0%	0	0%	5	$ 14,779
West Mountain	0	0%	0	0%	0	0%	0	0
Totals	**561**	**9%**	**9,478**	**33%**	**0**	**0%**	**9,910**	**$2,606,757**

URBAN/SUBURBAN IMPLEMENTATION

Storm Water Management

- Indirect treatment measures (wetlands) for the City of McCall, installed previously, are being maintained to treat storm water discharging to the North Fork of the Payette River. Additional work is scheduled for 2003-2004.
- Direct storm water treatment measures (Vortechs technology, sand and gravel filters) for the City of McCall were installed in the Legacy Park area previously. This facility is being maintained to treat storm water discharging to Payette Lake.
- An additional Vortechs system has been installed in the Art Roberts Park drainage area to treat storm water discharging to Payette Lake.
- A street-sweeping program has been initiated and maintained to remove traction materials distributed throughout the winter. These materials are being removed from streets and gutters and deposited in a location where they will not be entrained in snowmelt flows and carried into the storm water system.
- *The Handbook of Stormwater BMPs*, adopted by ordinance by the City of McCall and by resolution by Valley County, is recognized as being in need of update. Plans to appoint a committee to review the handbook and make appropriate recommendations are in progress.

Roadway Improvements

- Numerous street and drainage improvements were accomplished in 2002 associated with road improvements to Highway 55 within the City of McCall.
- Drainage and surface improvements on county roads (watershed-wide) have been completed.

Table 6 contains a summary of urban/suburban implementation projects completed in 2002 and the associated reduction efficiency and costs.

TABLE 6

Estimated Total Phosphorus Reductions Achieved and Associated Costs of Urban/Suburban Implementation Projects Completed in 2002

Conservation Planning*	Tier	Acres	Project Cost	Source of Funding
Storm water treatment system installed near Art Roberts Park	75%	96%	$37,851	Idaho Dept of Transportation and City of McCall funds
Parking lot upgrade and drainage improvements	65+%	65+%	$ 43,664	City of McCall funds
Sweeping program for removal of traction materials	65+%	65+%	$9,000/year	City of McCall funds
2002 Total	**65+%**	**65+%**	**$ 90,515**	**Idaho Dept of Transportation and City of McCall funds**

The total phosphorus reductions realized through implementation on urban/suburban lands are estimated from the efficiency of BMPs in place. Monitoring will continue to validate estimated reductions in total phosphorus loading.

SUMMARY OF TOTAL PHOSPHORUS REDUCTIONS

Table 7 presents a summary of implementation actions completed to date and the relative percent of the required reductions that has been accomplished. Total phosphorus reductions for nonpoint sources are estimated from the efficiency of BMPs in place. Monitoring will continue to validate estimated reductions in total phosphorus loading. Additional work has been funded and will be implemented in the coming year.

The current level of success enjoyed in the Cascade Reservoir watershed is due to a high level of participation and commitment on the part of all point and nonpoint sources in the watershed. The reductions achieved have resulted in improved water quality conditions in the reservoir. Improved dissolved oxygen conditions were observed in the reservoir in 1999, 2000, and 2001.

The overall reduction goal for point source loading identified by the Phase II TMDL is 3,947 kg/year total phosphorus reductions. With the completion of the J-Ditch project, estimated point source reductions equal 3,947 kg/year. This in combination, when combined with the previous reductions accomplished by the Idaho Fish and Game fish hatchery, achieves 100 percent of the point source reduction goal.

The overall reduction goal for nonpoint source loading is 11,031 kg/year total phosphorus reductions. Measured and estimated nonpoint source reductions (including reductions from septic to sewer upgrades) equal 4,593 kg/year (~41 percent of the nonpoint source goal). With the completion of implementation projects in 2002, forestry nonpoint sources achieved 100 percent of their reduction goal for total phosphorus.

Table 7 presents a summary of the estimated reductions and costs associated with the implementation actions completed to date for point and nonpoint sources on a land use basis. It also includes a breakdown of the relative calculated cost per kilogram over the projected lifetime of the identified projects. For several projects, the costs associated with implementation were not available or were estimated. In other projects, operations and maintenance costs were not available and were estimated. It should be recognized that the cost per kilogram calculated in Table 7 is, to some degree, an approximation and will be refined as more information becomes available.

TABLE 7

Summary of Estimated Phosphorus Loads and Reductions for Point and Nonpoint Sources within the Cascade Reservoir Watershed, 1994 through 2002

	Total Load (kg/yr)	Projected Reduction (kg/yr)[a]	Reduction Achieved to Date (kg)	Percent of Reduction Achieved to Date
Point Sources				
McCall Waste Water Treatment Plant[b]	3,947	3,947	3,947	100%
Idaho Fish and Game Fish Hatchery	218	508	508	100%
Point Source Totals	4,673	4,455	4,455	100%
Nonpoint Sources				
Forestry[c]				
Roadways		1,454	1,579	109%
Grazing/bank stabilization		1,198	1,096	92%
Total	**8,840**	**2,652**	**2,675**	**101%**
Agriculture	11,740			
Tier 1		849	100	12%
Tier 2		2,512	645	27%
Tier 3		124	0	0%
Total	**11,740**	**3,485**	**745**	**21%**
Urban/Suburban	4,423			
Roadways		754	200	27%
Storm water		445	55	12%
Subdivision storm water		160	?	?
Total	**4,423**	**1,359**	**255**	**19%**
Other				
Septic systems	2,205	1,544	838[d,e]	38%
Unidentified North Fork of the Payette River	5,118	1,535	0	0%
Natural and background sources	3,390	599	80[f]	13%
Nonpoint Source Total	35,716	11,174	4,593	41%
Grand Total	**39,881**	**15,121**	**8,540**	**57%**

Reductions Achieved Before the Phase II TMDL

	Total Load (kg/yr)	Projected Reduction (kg/yr)[a]	Reduction Achieved to Date (kg)	Percent of Reduction Achieved to Date
Point Sources				
Idaho Fish and Game Fish Hatchery	726	508	508	100%
Nonpoint Sources				
Septic systems	2,205	1,544	838[e]	38%

[a] Contains management, natural,7 and background loading.

[b] Construction of winter storage pond is not yet complete. Storage and delivery systems will be completed and tested. Additional options for effluent use are being investigated to ensure that the system will operate with no discharge to North Fork Payette River in extreme water years.

[c] Implementation monitoring will continue to review applied BMPs. Additional road segments will continue to be treated as part of timber harvest activities or independently.

[d] Work is proceeding toward a sewer system for the southwest side of the reservoir by way of a joint venture including improvements to the City of Cascade Wastewater Treatment facility.

[e] The 838 kg figure used assumes that all septic to sewer hookups completed included proper decommissioning of the septic tanks. This assumption has yet to be validated. Septic decommissioning is currently being evaluated.

[f] Estimated from calculated transport to North Fork Payette River from Payette Lake.

LAND-USE CHANGES FROM AGRICULTURE AND FORESTRY TO URBAN/SUBURBAN – 1999 THROUGH 2002

It was recognized in the implementation plan for Cascade Reservoir that land use distributions are not static. Data collected within the Cascade Reservoir Watershed show diminishing agricultural and forestry land use and increasing urban/suburban land use trends. It is acknowledged that changes in land use will continue to occur throughout the implementation process and into the future. The area of the watershed most vulnerable to this type of change is the valley floor and fringe areas along the foothills. Features such as view, topography, recreation potential, and access by public roads drives development decisions.

Valley County Planning and Zoning Conditional Use Permit applications during the 2002 calendar year were reviewed. Table 8 illustrates the reduction of forestry lands and agricultural lands by subwatershed. Table 5B has not been adjusted to reflect the change in land use from agriculture to urban-suburban.

TABLE 8

Summary of Total Estimated Cost per Kilogram of Calculated Phosphorus Reductions for Point and Nonpoint Sources in the Cascade Reservoir Watershed TMDL

	kg/yr	Total $	Estimated op. and maint. cost/year	Estimated $/kg/year over project lifetime
Point Sources				
McCall Wastewater Treatment Plant	3,947	$9,996,000	$38,000	$136
Nonpoint Sources				
Forestry				
Roads	1,579	$1,719,214	$131,454	$192
Grazing	1,096	$98,057	$44,050	$49
Total	**2,675**	**$1,817,271**	**$175,504**	**$134**
Agriculture				
Tier 1	100		$891	
Tier 2	645		$13,875	
Tier 3	0		$0	
Total	**745**	**$452,470**	**$14,766**	**$81**
Urban/Suburban				
Roadways	200	$138,600	$19,170	
Urban storm water	55	$235,711	$948	
Subdivision storm water	0		$0	
Total	**255**	**$374,311**	**$20,118**	**$226**
Other				
Septic systems	838	8,043,000	$5,320	$486
Unidentified North Fork of the Payette River	0			
Background sources	80	90,515	4,500	$113
Total	**918**	**$10,777,565**		
Point Sources	**3,947**	**$9,996,000**	**$38,000**	**$136 (average)**
Nonpoint Sources	**3,755**	**$2,734,567**	**$34,270 (avg)**	**$183 (average)**
Septic to Sewer Upgrades	**838**	**$8,043,000**	**$5,320**	**$436 (average)**
GRAND TOTAL	**8,540**	**$20,773,565**		**$252 (average)**

Storage pond application and septic to sewer upgrades are projected to have a 20 year lifetime. Other nonpoint source practices were projected to have a 10-year lifetime. These costs are not complete and should be considered draft at this time. Total expenditures, operations and maintenance, and some other costs have not yet been accurately accounted for in some categories and in some subwatersheds.

TABLE 9

Acres of Land Use Changed from Agriculture or Forestry to Urban/Suburban in 2002 by Subwatershed Based on Approved Conditional Use Permits

Previous Use	Boulder-Willow	Mud Creek	Lake Fork	Cascade	West Mtn.	Gold Fork	North Fork	Total
Agriculture to urban-suburban	633	10	19	105	670	11	5	1,453 Acres
Forest to urban-suburban	957	0	0	0	2,398	0	0	3,555 Acres
Total acres of landuse change in 2002	1,590	10	19	105	3,068	11	5	4,808 Acres
Total acres of landuse change in 2000-2001	68	36	520	37	0	6	54	721 Acres
Overall acres of lands changed 2000-2002	**1,658**	**46**	**539**	**142**	**3,068**	**17**	**59**	**5,529**

TABLE 10

Adjusted Agricultural Acres and Loading as Based on Land Use Changes Identified from April 1999 to December 2002

Subwatershed	Total TMDL Load (kg)	Adjusted Total Load (kg)	30% Reduction (kg)	Acreage Required for 30% Reduction	Adjusted Acreage Required for 30% Reduction
Boulder/Willow	2,353	2,075	902	5,943	5,242
Cascade	287	278	110	4,513	4,371
Gold Fork	811	808	311	4,869	4,852
Lake Fork	2,502	2,241	958	5,166	4,627
Mud Creek	710	705	272	6,479	6,433
North Fork Payette	1,986	1,965	762	5,529	5,470
West Mountain	444	381	170	4,696	4,026
Totals	**9,093**	**8,453**	**3,485**	**37,195**	**35,021**

The land use most affected by these changes is agriculture because the total phosphorus reductions required from agricultural lands are dependent on the acres of land available for treatment. The values detailed in Table 9 indicate that of the 4,808 acres changed to urban-suburban land use in 2002. Of this total, 1,543 acres were from agricultural lands (30 percent) and 3,355 acres from forested lands (70 percent). Overall, the land use changes identified for agricultural and forestry lands from April 1999 through December 2002 represent a total decrease of over 5 percent in irrigated agricultural and pasture lands and over 2 percent in forested lands. Table 10 shows the adjustments these changes represent to the total phosphorus load reductions identified for agricultural land use acres by the TMDL, reflecting change to urban-suburban use.

The current Phase II TMDL (DEQ, 1998) does not reflect these land use changes in either the acreages identified or the load allocations required. As acreages continue to undergo changes in land use designation, these will be updated through the iterative TMDL process. The next opportunity for changes to be made to the TMDL will occur during the Phase III review scheduled for 2003.

A method to account for non cost-share BMP implementation for agricultural lands has been established. The Idaho Soil Conservation Commission developed an accounting system to track contracted cost shared and non-cost shared BMPs. The database is populated regularly and maintained by the Valley Soil and Water Conservation District. A closer examination of the conditional use permits approved for subdivisions, planned unit developments, and industrial sites bordering or containing Tier 1 lands should be performed. If the review shows that the covenants or conditions of approval are sufficient to protect the Tier 1 lands, those acres could be considered treated.

This summary of activities for Cascade Reservoir was provided courtesy of Tonya Dombrowski.

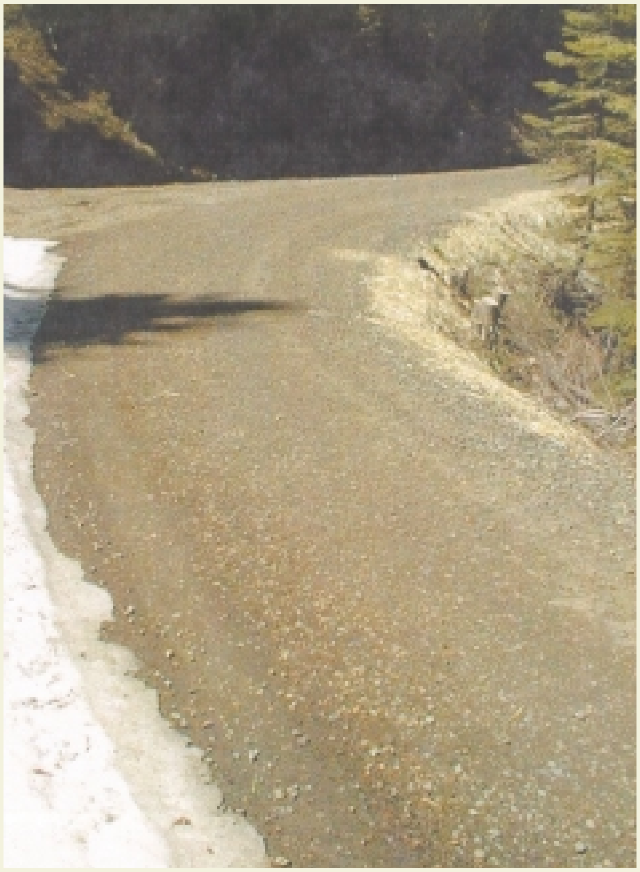
BEFORE AND AFTER SCENES IN THE CASCADE RESERVOIR AREA

BEFORE: *Drain ditch leading to Cascade Reservoir prior to installation of BMPs.*

AFTER: *Drain ditch after cattle have been removed from the ditch area and vegetation reestablished.*

Cascade Reservoir

BEFORE: *Dirt roads are a major source of sediment, phosphorous, and other contaminants to Cascade Reservoir.*



AFTER: *Proper slopping, rolling water bars, culverts, and gravel eliminate a great majority of sediment being carried to Cascade Reservoir.*

Over grazing and improper grazing techniques adjacent to Cascade Reservoir seen above have been replaced with proper grazing and reestablishment of riparian vegetation seen below.

Succor Creek of the Snake River

The multiyear Succor Creek/Homedale School District Water Quality Project is highlighted this year because the project involves simple straightforward methods to clean up water that has for many years been subject to agriculturally related pollution. The project involves removing sediment and nutrients from the return irrigation water with bioretention and biofiltration wetlands before the water reaches Succor Creek. Succor Creek, a 303(d)-listed stream for sediment and a tributary of the Snake River, will meet TMDL targeted loads easier with this treatment. The site will also serve as an example to area producers who face similar water quality issues.

This project is a good example of joint efforts among many parties. Multiple landowners, local officials, the local school district, DEQ, the Owyhee Soil Conservation District, the Natural Resources Conservation Service (NRCS), the Idaho State Department of Agriculture (ISDA), a local consultant engineering company, and ordinary citizens have all contributed to the project. A local school's staff and students will monitor the wetland as a continuing science project. No future funding will be required, as any additional equipment will be purchased through the school's general funds. Samples will be taken at regular points and intervals on the site with assistance from the ISDA.

During the field evaluation DEQ determined that the project has been constructed in a satisfactory manner. All excavations for the forebay, filter strip, and water impoundment areas are complete. The weir and outfall structure for water level control are installed and functioning. The appropriate wetland plants were planted approximately two months prior to the evaluation and appeared to be flourishing. While there was no irrigation occurring at the time of the evaluation, water was diverted into the complex to demonstrate that the appropriate grades were achieved during construction. The flow rate and patterns match what had been anticipated in earlier planning stages.

Irrigation at this site is not a constant. While there will be enough water to support the plant community, the water level will seldom be at the design capacity. One solution to this problem will be to divert some of the flow of a nearby stream into the complex to help drive the hydrology. The filtering capacity of the wetlands will also improve water quality in this stream.

Although chemical sampling will be part of the future monitoring regiment, a visual inspection of the water leaving this site showed that it was indeed cleaner than water coming into the wetlands.

Staff anticipates that as the vegetative community matures in the constructed wetland this project will provide the dual functions of cleaning up NPS pollution while providing an outstanding educational tool for the school and the community. There are plans to add a pavilion structure to aid in the education of students and the community.

The following photographs were taken of the Succor Creek/Homedale School District Water Quality Project during the 2002 project evaluation.

Succor Creek

Forebay leading into preliminary filter strip, July 30, 2002.

Flow regulation in preliminary filter strip, July 30, 2002.

Stone Check Dam at end of preliminary filter strip, July 30, 2002.

Deep water cell, 7/30/02. Note: Recently planted rushes doing well.

Outlet structure in deep water cell, July 30, 2002.

Restored Bank: Succor Creek, left view, July 30, 2002.

Rapidly establishing wildlife community, July 30, 2002.

Jim Ford Creek

The multiyear Jim Ford Creek Watershed Enhancement Project is highlighted this year because the project involves several effective methods to clean up water that has for many years been subject to agriculturally related pollution. Jim Ford Creek is a tributary to South Fork of the Clearwater River.

The goal of the Clearwater Soil and Water Conservation District and co-sponsoring project agencies is to reduce nutrients, sediment, and bacteria loading to Jim Ford Creek. This is being achieved through the capture of fine sediment with riparian vegetation in the restored stream section. Stream bank stability improvements decrease sediment and absorb phosphorus. Filtering runoff by streamside vegetation reduces bacterial contamination, reduces soil erosion, conserves soil resources, and decreases sediment delivery within the watershed.

Partners in this project include numerous farmers and ranchers, the Clearwater Highway District, the NRCS, Idaho Soil Conservation Commission, Ducks Unlimited, Idaho Department of Fish and Game, and DEQ.

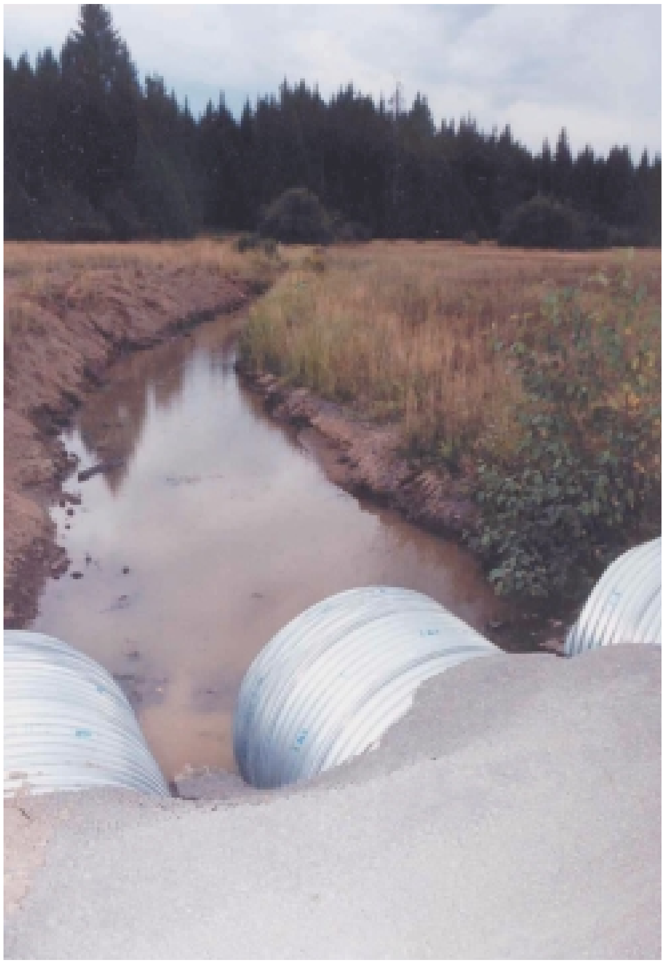
One water quality project included establishing riparian plantings that serve as sources of shade to cool the stream and a filtration zone for nutrients and bacteria, and offering stream bank stabilization. The installation of many miles of fencing in key areas not only keeps livestock away from the stream banks, but also helps protect young seedlings from browsing by deer and elk. Other stream bank restoration measures include willow and shrub plantings and repaired meanders.

The project included installing cattle guards and applying crushed aggregate to stretches of dirt roads that were previously contributing sediment to Jim Ford Creek. Thirty-four new culverts, rock lining, armoring, and hydroseeding are all helping to slow and control runoff, which, in turn, is eliminating gully washing, bank erosion, and storm water flow over the roadways.

The elimination of grazing within certain key areas, the relocation of a corral away from Jim Ford Creek, and the construction of an off-site watering pond are all examples of private landowner cooperation. Another cooperative major water quality protection measure is the relocation and construction of state-of-the-art AFOs.

One of the private landowner AFO projects constructed during 2002 consists of two buildings with sidewalls. The purpose of this project is to retain all waste generated by 120 animals for the total calculated confinement period (October–May). This facility includes a concrete floor spanning the full length of both the feeding area and the solid waste stacking area. The full length of this facility has a raised border of no less than 6 inches. This facility is now being maintained by the rancher to ensure that all animal waste is contained within the facility and not allowed to enter surface or ground water.

A fence and a corral system were constructed within the AFO complex to effectively manage the rotation and movement of the animals to reduce the impact of soil distribution and potential water quality problems. A pipeline now conveys water from the creek to a watering trough located within the feedlot, as opposed to the previous arrangement of simply allowing livestock to enter the creek.



A series of bermed and fenced ditches create an effective roof runoff system. This system collects and transfers all clean, uncontaminated roof runoff from the feedlot site to a suitable infiltration area offsite. Some ditches consist of 6-inch perforated drain tile covered with filter cloth and drain rock. Open ditches are now fenced on both sides to prevent livestock access.

The total AFO project cost was $131,482.53; including $58,515.11 paid by the landowner; $14,593.49 paid by the ISDA, and $58,373.93 paid through NPS grant funding.

A second similar but smaller AFO, consisting two buildings with sidewalls to properly manage the storage for a 30 cow/calf operation for the total confinement period from October through May, is currently 90 percent complete. The facility is scheduled to be completed in summer 2003 and will be managed to ensure the adjacent stream water quality is not impaired.

The photographs below were taken during the 2002 field evaluation of the Jim Ford Creek Watershed Enhancement Project.

Clearwater Highway District personnel installing culverts on Mussellshell Road.

Jim Ford Creek

Private landowner confined animal feeding operations.

Private landowner confined animal feeding operations being modified to greatly reduce sediment and other contaminant runoff.

Some of the wildlife on a tributary to Jim Ford Creek benefiting from nonpoint source project work accomplished over the past several years.

Paradise Creek

The Palouse-Clearwater Environmental Institute of Moscow is overseeing a set of multiyear projects along Paradise Creek. Paradise Creek is a tributary to the Palouse River and in turn the Snake River and Columbia River. Four urban-related projects are highlighted.

WHITE AVENUE STREAMBANK STABILIZATION AND REVEGETATION

This project area is owned by the City of Moscow and involves a joint effort between the city, the Palouse-Clearwater Environmental Institute, and community volunteers. Previous conditions along this stream segment included near vertical, slumping, and eroding stream banks that were contributing to the sediment load in the creek. There was a lack of native woody vegetation close to the creek to help in shading. Paradise Creek had been dredged within the city limits many times in the past, which added to its degraded state.

Historically, the city dumped asphalt on the sides of the stream for bank stabilization. After the asphalt was removed, 258 feet of stream bank were re-sloped and planted with several hundred native plants. Approximately 2,280 square feet of floodplain was then hydroseeded with a native seed mix and covered with biodegradable erosion control fabric.

EAST MOUNTAIN VIEW RESTORATION

Work on this city-owned stretch of the creek involved a joint effort by TerraGraphics Environmental Engineers, AmeriCorps, the City of Moscow, Washington State University environmental science students, Moscow elementary school students, Synthetic Industries, and community volunteers.

Prior to the work, the urban reach of Paradise Creek had near vertical, slumping, and eroding stream banks that were straightened due to dredging activities. The majority of the stream bank soil was exposed resulting in sediment infill due to stream bank undercutting and erosion. There was very little diversity in vegetation at this site and no native woody vegetation was present to shade the creek. Paradise Creek is on the 303(d) list for sediment and temperature as pollutants in an approved TMDL.

The project involved reconstructing 1,720 feet of meandering stream channel with floodplains on both sides of the channel. Two new wetlands were constructed as well. Volunteers installed over 1,500 woody plants and 1,100 herbaceous plants. The reconstructed channel was stabilized with a number of different bank stabilization BMPs including buried log cribbing, root wad revetments, and soil wraps. Bank revetments were placed in scour susceptible zones along outer bend banks. Extensive revetments were required because of heavy springtime flows and downstream sediment concerns. Bank revetments are restricting the movement of the channel without compromising its natural appearance. Woody stream bank vegetation was planted along all revetments. Native riparian hardwoods such as shrub willow, aspen, and dogwood will eventually provide intertwining root networks for long-term bank stabilization in these areas.

The crown of the stream channel was rounded off to make a smooth transition to the floodplain surface. All outside bank slopes were then seeded with a native riparian grass mix and lined with a 100 percent biodegradable geotextile fabric. The fabric was carried over the top of the slope crown onto the level edge of the floodplain surface.

Open weave straw-matting was used in lower energy areas; tighter weave coir matting was used in higher energy areas. The straw matting will retain its structural integrity for two to three years; the coir fabrics for at least five years. This will allow time for a dense herbaceous ground cover to become established on all bank surfaces.

The two newly constructed wetland areas are approximately 1 to 1.5 feet in depth with a 5:1 slope on each side. An existing wetland at the site was extended to enhance its animal habitat. Native woody vegetation was planted in the area and will continue to be enhanced over a period of years. Species were selected from a comprehensive list of riparian and upland trees and shrubs native to this environment.

In October 2002, once all of the hardscape BMPs were in place and final grading had been completed, the Palouse-Clearwater Environmental Institute sponsored an all-day workshop for the elementary schools in the Moscow School District. At the workshop over 200 elementary school students participated in planting a variety of native riparian plants and learning about environmental stewardship.

STREETS WETLAND AND LEFORS WETLAND

These two similar projects are located on private, urban land along separate tributaries to Paradise Creek. The purpose of both projects is to create wetlands that offer the benefits of flood control, provide native habitat for wildlife, filter pollutants, provide recreational and educational opportunities, and improve water quality for Paradise Creek.

Both project areas are inundated for a significant portion of the year and are therefore suitable locations for wetlands. Reed canary grass is the dominant vegetation along the stream segments. Few trees or other woody plants were present on either site and both have significant contaminant sources such as horse barns and horse pastures. One landowner visualizes a "pick your own" produce farm adjacent to the wetlands and the other would like to establish native habitat including an area for environmental educational events.

Both wetlands are about 100 feet wide and 275 feet long. Both wetlands fluctuate in depth from 1 to 1.5 feet as the season dictates. The wetland designs allow the waters of the adjacent streams to enter into the areas while providing defined channels for water movement in low flow situations. Herbaceous wetland plants will be planted to help improve water quality by reducing nutrient loading through filtering. Native willow and red-osier dogwood cuttings will be planted along the banks of each stream to secure the banks and introduce shade to the system. This will create a woody riparian buffer. Woody riparian buffers offer many benefits, including filtering runoff, providing wildlife habitat, and retaining floodwaters.

The following photographs depict some of the work accomplished along the urban portion of Paradise Creek during 2002.

Paradise Creek

Installation of biodegradable straw/coconut fiber logs for stream bank stabilization at the White Avenue sub-project. This is one of many best management practices used on Paradise Creek.

White Avenue area after bank stabilization and restoration were completed.

Lefors wetland prior to planting.

Volunteers planting native plants at Lefors Wetland.

Initial grading at Streets Wetland.

Streets wetland shortly after completion.

Hundreds of local school children participated in an all-day workshop at the East Mountain View Project.

They learned about microorganisms, biodiversity, and the need for riparian environments.

They also learned about riparian wildlife and the need for undeveloped floodplains.

...and how stream channels are reconstructed.

They planted hundreds of plants...

...and learned how to take better care of the environment.

Summary of Three Projects Completed During Federal Fiscal Year 2002

Completion reports were submitted for three projects during Fiscal Year 2002. The following are brief summaries for the Lower Boise River Coliform Bacteria DNA Testing Project, the OX Ranch Agriculture BMP Implementation Project, and the Ground and Surface Water Interaction Related to Nutrients Within Mason Creek Agricultural Drain Project.

Lower Boise River Coliform Bacteria DNA Testing

Location and Background

The lower Boise River watershed begins at Lucky Peak Dam and continues approximately 40 river miles to the confluence with the Snake River near Parma, Idaho. This watershed is approximately 1,300 square miles and contains about one-third of Idaho's population. The land use varies from urban and suburban uses to agricultural farmland. Approximately 350,000 acres of irrigated farmland are contained in the watershed. The irrigation water is diverted from the lower Boise River and distributed through a series of canals and ditches to individual farms. The return water from the agricultural fields, as well as storm runoff, is collected through privately owned drains that discharge to the lower Boise River.

Publicly owned wastewater treatment plants that use secondary treatment technology prior to discharging to the lower Boise River serve approximately 260,000 people living within the watershed. Approximately 100,000 people within the watershed use private septic systems.

In 1992, DEQ placed the lower Boise River on the state 303(d) list as an impaired water body. The designated uses for the lower Boise River are cold water, salmonid spawning (upper reaches only), primary and secondary contact recreation, potable water (upper reaches only), and agricultural water. Nutrients, dissolved oxygen, grease and oils, temperature, sediment, and bacteria were identified at that time as impairing the designated uses. A formal TMDL document was submitted to the U.S. Environmental Protection Agency in December 1998 and approved in January 2000. Several pollutants were eliminated as potential problems during the subbasin assessment phase of the TMDL, and only sediment and bacteria were addressed. The next phase of the TMDL process includes preparing an implementation plan for sediment and bacteria. This overall plan is being developed from source-specific implementation plans that are being prepared by source groups representing point source municipal and industrial stakeholders, urban and suburban storm drainage interests, and nonpoint agricultural interests.

Results

Through DNA testing, percentages of fecal coliform and *E. coli* have been linked to human, agricultural, avian (non-waterfowl), waterfowl, and other wildlife categories for each of eight sampling stations along the lower Boise River and major tributaries (Figure 4). Results of this investigation will allow the TMDL implementation plan to address how the load allocations for bacteria should be addressed through BMPs. A secondary purpose for this study is to show the applicability of DNA testing technology for use in other watersheds throughout Idaho requiring bacteria TMDLs.

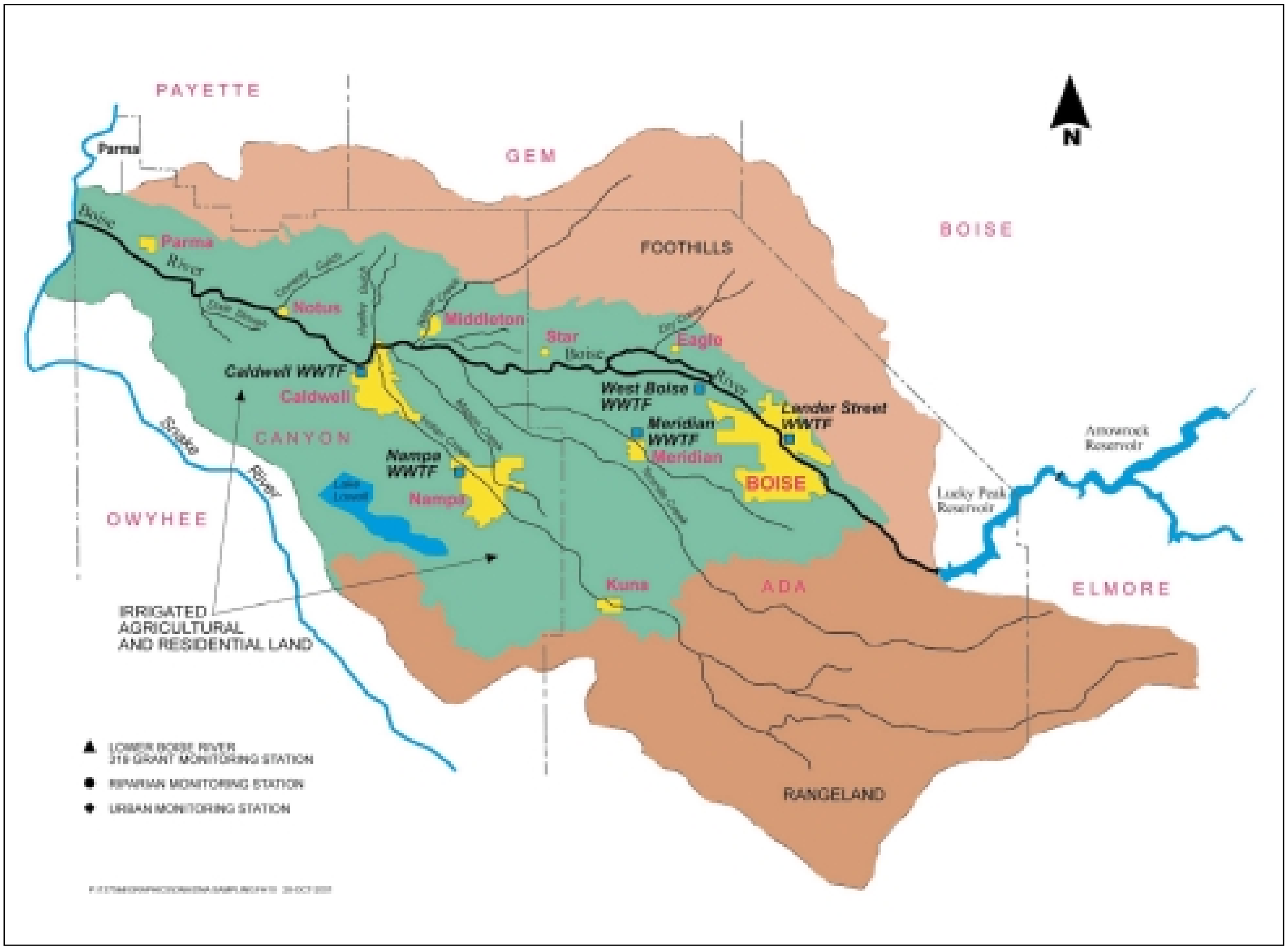
Complete elimination of controllable bacteria sources represents a best-case scenario that is unlikely given the available resources, particularly in the rural areas of the watershed where bacteria concentrations are high. This suggests that a more realistic short-term approach that entails enforcing existing ordinances and permit limits that control human, agricultural, and pet waste should be implemented. As the BMPs that limit the controllable sources are implemented and become effective in the short term, the number of anthropogenic *E. coli* organisms in the water should decrease, leaving the uncontrollable levels as background.

The complete report, including maps, tables, appendices, and figures may be found on DEQ's Web site at: **http://www.lbrwqp.boise.id.us/dna_test/Boise_DNA_Report.pdf**.

FIGURE 4

Lower Boise River DNA Sampling Locations

LOWER BOISE RIVER WATER QUALITY PLAN



OX Ranch Agricultural BMP Implementation Project

Introduction

This project was designed to improve water flows and fish habitat in the Lick Creek drainage. Located in west-central Idaho, Lick Creek drains into the Wildhorse River, which in turn drains into the Snake River (Figure 5). All three drainages are listed as impaired water bodies.

Prior to this project, irrigation water was diverted from Lick Creek and transported in ditches to the OX ranch to be used for irrigation. The NRCS estimated that water lost through ranch irrigation ditch banks was as high as 75 percent. In other words, only 25 percent of the water diverted from Lick Creek was actually being applied to the hundreds of acres of crop and pasture lands owned by the OX Ranch.

Phase I

Livestock compounded the problem of water loss due to leaky ditches. The leaky ditches caused wet areas below the ditches that attracted livestock. While yielding very little value for livestock, those areas became elevated in nitrate, phosphorous, and sediment, which then contaminated Lick Creek. In spite of the landowners' efforts, "ditch-loss" continued to be a problem. Discussions developed on how to reduce this waste and improve stream flows and overall stream health. The NRCS studied the issue and developed a plan to eliminate the ditch by putting the water in a pipe to more efficiently accomplish most irrigation needs for OX Ranch.

In the fall of 2000 a diversion structure designed by the Weiser NRCS and funded by the landowner was built. The structure prevented fish from entering the ditch and allowed them safe passage back to the stream channel. In order to eliminate the ditch entirely, a pipeline was designed to replace 3.1 miles of open ditch. However, cost estimates were so high that it became obvious that the landowners could not afford to proceed. Just when it appeared that this project would die on the drawing board, the landowners began discussions with numerous agencies and conservation organizations about grant funds that could assist in achieving their goals. Through a chain of events, DEQ and NPS 319 funding came into the picture.

Phase II

This project benefits the environment and the rancher by reducing nutrient and sediment loading through improved irrigation and grazing management practices and improved summer water temperatures within Lick Creek.

The pipeline spans approximately 3.1 miles of open ditch. This project furnishes water to 145 acres of land and carries approximately 5.9 cubic feet per second of water. This project also included installation of six off-site stock watering facilities, totally eliminating stock access to Lick Creek and reducing associated riparian impacts.

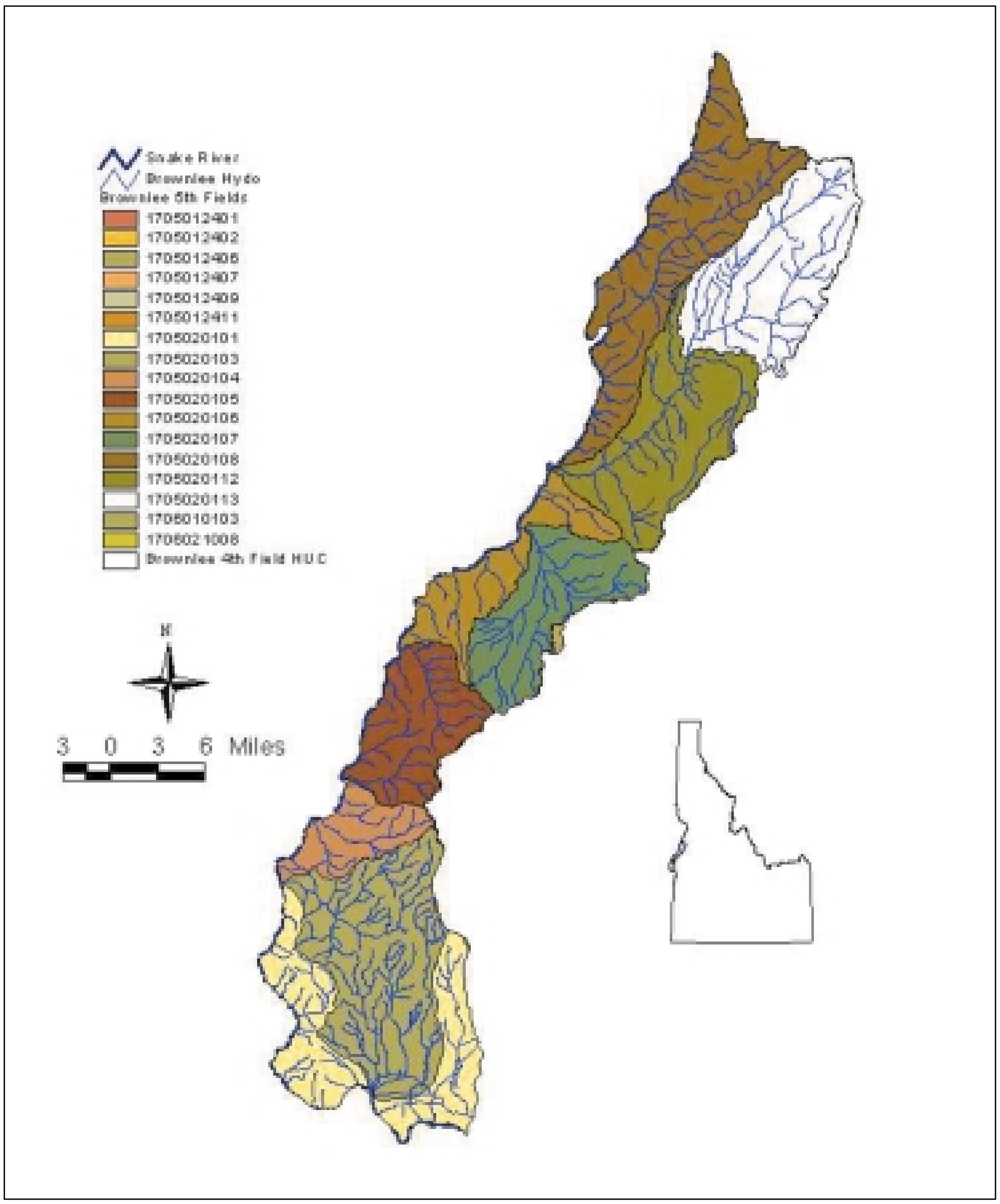
Specific benefits resulting from this project include:

- WATER QUALITY IMPROVEMENTS – This project reduces sediment, nutrient, and heat loading to Lick Creek and the downstream Wildhorse River. Both are currently identified as impaired due to nutrient and sediment loading and elevated water temperatures. The Wildhorse River is a tributary to the Snake River; a TMDL for this segment of the Snake River is currently near completion.

- RIPARIAN IMPROVEMENTS – Off-site water access and facilities (stock watering tanks in six different pastures) eliminated stock access and the related impacts to riparian areas along Lick Creek. Improved riparian vegetation is resulting in less warming of Lick Creek due to denser shading.
- IMPROVED INSTREAM FLOW DURING CRITICAL SUMMER TIME PERIODS – Water savings resulting from elimination of "ditch loss" results in greater instream flows during the irrigation season which will improve fish habitat and stream health and lower summer water temperatures. This will result in improved support of aquatic life beneficial uses.
- INCREASED IRRIGATION EFFICIENCY – Irrigation water can now be applied in a more timely and controlled manner resulting in less runoff and therefore reduced environmental impacts and improved stream flows.

FIGURE 5

Brownlee Reservoir 5th Field Hydrologic Units and Streams



The entire hard copy of the project summary report *OX Ranch Agricultural BMP Implementation Project* is available for public use at DEQ's State Office, 1410 North Hilton Street, Boise, ID. Contact Ms. Barbara Mallard at (208) 373-0502 83706.

Photos showing some of the project's accomplishments follow.

One of two stock ponds with overflow systems created along the 3.1-mile long pipeline.

One of nine water tanks installed along the pipeline.

The pipeline being used for irrigation.

Irrigation along a field of grass near the end of the pipeline.

Ground and Surface Water Interaction Related to Nutrients within Mason Creek Agricultural Drain

Introduction

In 2000, DEQ allocated federal Clean Water Act Section 319 money to the ISDA to study surface and ground water interaction in the lower Boise River Basin at a small scale. The study was initiated as a result of degradation of the surface and ground water systems in the basin due to excessive amounts of phosphorous and nitrogen entering the system over the past several decades. There are thought to be several potential sources of these pollutants, including organics, animal and/or human wastes, and agricultural crop fertilization activity in the area. An additional purpose of the investigation was to gain a better understanding of the system to provide input to the U.S. Environmental Protection Agency required TMDL for phosphorous in streams in the basin.

Project Description

Two sites along Mason Creek in Canyon County were selected for the study (Figure 6). A network of monitoring wells was established in June 2000 at each site and subsequent monitoring and field work were performed through December 2001. Water quality data (collected monthly), physical measurements of the ground and surface water system, historical data, and other on-site data collection provided the basis for the evaluation. Data gathered from the sites provided input to hydrogeologically characterize and statistically evaluate the ground and surface water interaction.

Results

At the upstream site (approximately 5 miles from the confluence with the Boise River) and the downstream site (approximately 1 mile from the Boise River), the data indicate that the ground water system was hydraulically connected and seasonally contributed both phosphorous and nitrate-nitrogen to the drain. Static water level measurements showed ground water to be less than 6 feet below land surface and contouring indicated that ground water flow interacts with Mason Creek. Flow measurements indicate that at both sites the Mason Creek drain gains water rich in phosphorous and nitrate-nitrogen during early spring and loses water during the summer and winter. The gaining and losing stream flow patterns cause complex dispersions of pollutants to ground and surface water. The study suggests agricultural fields can be sources of nutrients that leach into the shallow ground water. The shallow ground water can then flow into a drain, increasing the nutrient load of the surface water and ultimately the Boise River.

Recommendations

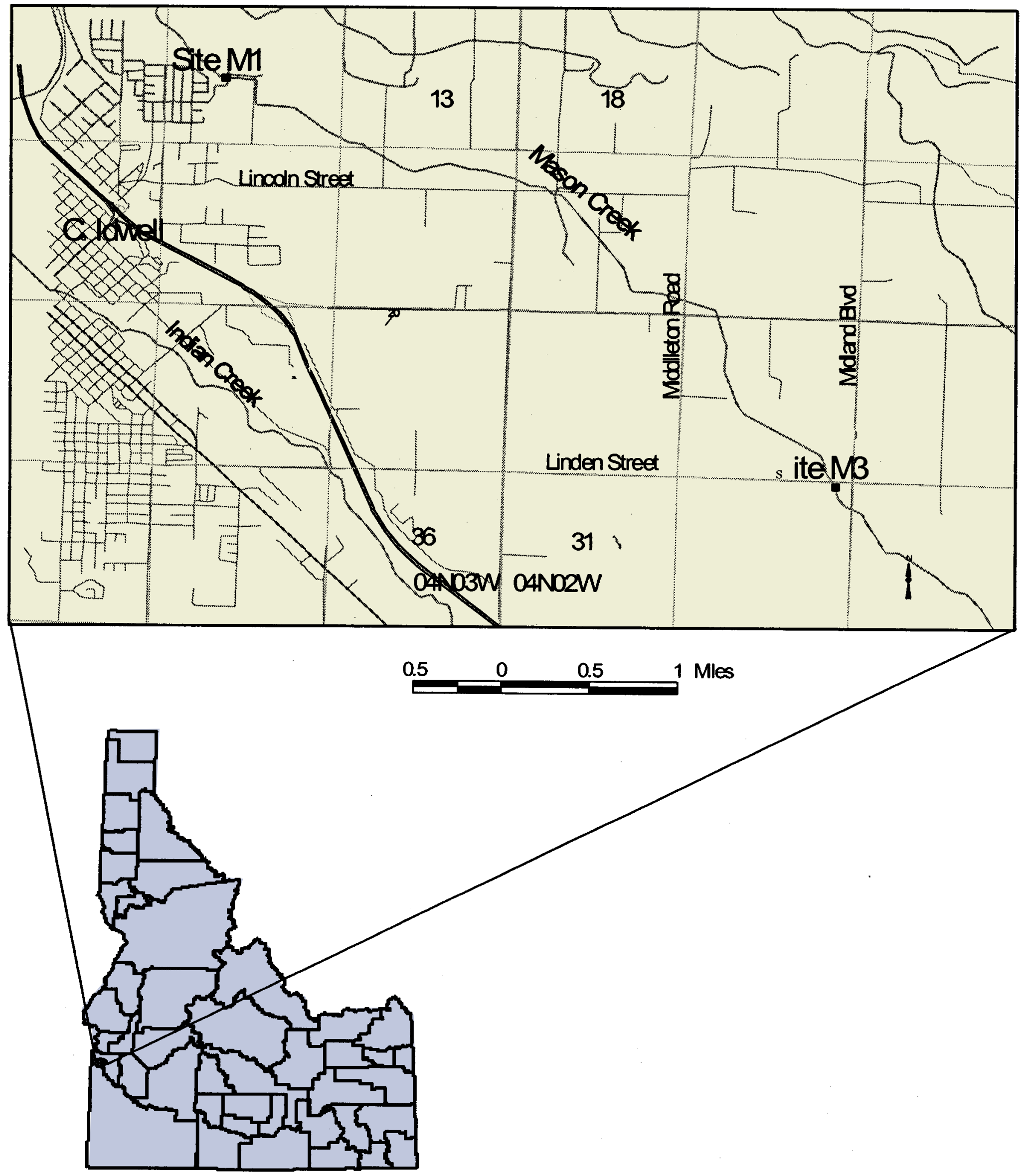
Based on the results of the study, the ISDA recommends that measures to reduce nutrient impacts on ground water be addressed and implemented. The ISDA recommends that:

- The methods and approach of this study could be used as a model for a BMP effectiveness evaluation for nitrate and phosphorous leaching at agricultural sites.
- Findings from this study can be used to educate farmers, Soil Conservation District personnel, and other agricultural stakeholders.
- Nutrient management plans should be implemented on farms to prevent nutrients leaching from the shallow ground water.

The entire hard copy of the project report, *Ground and Surface Water Interaction Related to Nutrients within Mason Creek Agricultural Drain,* is available for public use at DEQ's State Office, 1410 North Hilton Street, Boise, ID 83706. Contact Ms. Barbara Mallard at (208) 373-0502. The report is also available on ISDA's website at **http://www.agri.state.id.us/PDF/gw/MasonCreek3-27-02.pdf**.

FIGURE 6

Location Map for Mason Creek Project



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